December 10, 2015

MEMORANDUM

TO:	Public Service Commission
FROM:	Bob Decker, Public Policy Bureau Chief
THROUGH:	Will Rosquist, Regulatory Division Chief
	Robin Arnold, Policy Analyst
	Margo Schurman, Policy Analyst
RE:	Northwest Power and Conservation Council Draft 7th Power Plan

Background

The Northwest Power Act (of Congress) of 1980 established the Pacific Northwest Electric Power and Conservation Planning Council ("Council") and directs the Council to adopt a regional energy conservation and electric power plan and a program to protect fish and wildlife on the Columbia River and its tributaries. The Power Act defines the Pacific Northwest area as the states of Oregon, Washington, Idaho, and the portion of Montana west of the Continental Divide (as well as small Columbia-basin areas in Nevada, Utah, Wyoming). The Council is governed by an eight-member group comprising two appointed representatives from each of the four principal states in the region.

The Council updates both the fish and wildlife plan and the 20-year power plan every five years. The power planning effort must fulfill the purposes of the Power Act, which include:

- To assure the Northwest of an adequate, efficient, economical, and reliable power supply;
- To encourage conservation and efficiency in the use of electric power and the development of renewable resources in the Northwest;
- To provide for the participation of states, local governments, consumers, tribes, and other regional constituencies in the planning process; and
- To protect the fish and wildlife of the Columbia River and its tributaries.

The Council released the Draft 7th Power Plan in October 2015. On June 30, 2015, Montana's two members of the Council met with the Public Service Commission to discuss the power planning process. In early November, the Council held hearings in Kalispell and Missoula to collect public input on the Draft 7th Plan.

The Council has set a deadline of December 18, 2015, for public comment on the Draft 7th Plan.

Structure of Draft 7th Plan

The Council applies an integrated resource planning strategy and philosophy (also called least-cost planning). This approach recognizes load uncertainty, emphasizes risk management, and reviews all available and reliable resources to meet current and future needs.

The Draft Plan includes five parts: "Executive Summary," "Resources Strategy and Action Plan," "Demand and Price Forecasts," "New Resource Potential," "Developing a Resource Strategy," and "Other Plan Elements" (transmission planning, environmental methodology, and fish and wildlife program). The parts are made up of 20 chapters.

The Draft Plan includes 15 appendices, which address financial presumptions, various forecasts (electricity prices, fuel prices, economic, and energy demand), conservation and generating resources, modeling methods, and climate change impacts. Numerous technical data sources are also provided with the Draft Plan.

Overview of Draft 7th Plan

Based on modeling used to test how different resources would perform under a range of future conditions, the Draft Plan finds that "energy efficiency consistently proved the least expensive and least economically risky resource." Acquiring that energy efficiency is the Draft Plan's primary action for the next six years.

The Draft Plan's second priority is to develop demand response resources or rely on increased market imports to meet the Northwest's power system capacity needs under critical hydro and weather conditions. It's likely that in low water periods, the region will need additional winter peaking capacity to maintain system adequacy.

After efficiency and demand response, the next most cost-effective resource option for the region is new natural gas-fired generation. Together, efficiency, demand response, natural gas generation, and new renewable energy (required by renewable portfolio standards, which exist in three of the region's four states), make up the principal components of the Draft Plan's resource portfolio.

Figure 1-2, from the "Executive Summary" of the Draft Plan and reproduced on page 8 of this memo, shows the average resource development across all futures modeled by the Council. (Demand response, considered as a resource for addressing peak demand, is not included in average capacity calculations.)

The projected contributions in 2035 from significant (new) resources include:

- Energy efficiency 4,558 MW
- Natural gas 320 MW
- Solar 128 MW
- Wind 96 MW

TOTAL 5,102 MW

In presenting its anticipated resource portfolio, as well as making the consumption, development, economic, and policy projections that underlie it, the Council emphasizes that its Draft Plan provides regional guidance and that individual utilities have varying needs and access to markets and may make singular investments in resources to meet their adequacy and reliability needs. As a result, new natural gas generation may be required by a particular utility, even if that utility pursues efficiency and demand response.

Key Projections

- Loads: increase 2,200-4,800 aMW by 2035 (110-240 aMW/year)
  - Growth = 0.5-1.0%/year
- Peak load (winter): from 31,000 MW in 2015 to 32,000-36,000 MW in 2035
  - Growth = 0.4-0.8%/year
- Wholesale electricity price (Mid-C): from $32.50 in 2014 to $33-$60 in 2035 (2012 dollars)
- Natural gas: $3.50/MMBtu in 2015 to $3.00 (low-range) or $10 (high-range) in 2035
- Demand response: 1,500 MW available at less than $25/KW peak capacity/year
- Generation resources (see Figure 1-4, page 8)
  - Efficiency $ 18-$30 (per MWh)
  - Nat. gas/CCCT $ 75
  - Solar PV/base $ 99
  - Wind/Colum. $115
  - Nat. gas/recip. $142
  - Nat. gas/aero $145

System Trends and Changes

- **System shift:** Several factors, including increased reliance on variable-energy resources and the balancing of fish and power needs in the hydro system, have made the Northwest more capacity-constrained and less energy-

constrained. This is a large and ongoing change from the traditional state of the regional system.

- **Imported power:** Past regional power plans placed no reliance on power imported from external markets (Canada, California, and the Southwest). In this plan, the Council modeled a scenario in which such imports of peak power were found to be less costly and economically risky than demand response.
- **Renewable slowdown:** Renewable energy development, especially wind, is not expected to proceed as rapidly as in the recent past because the region currently has an energy surplus, yet faces challenges in meeting peak loads. Renewables contribute energy, but offer little value in providing winter peak capacity.
- **Natural gas:** Across the Draft Plan's modeling scenarios, the need for new natural gas generation varied widely. Local situations may require new natural gas facilities, but from a regional aggregate basis, the need for additional new natural gas generation is very limited through 2021. By 2026, the probability of gas development rises to 80% in scenarios where existing coal plants and less efficient gas-fired generation are retired to lower carbon emissions.
- **Coal:** The Draft Plan anticipates no new coal-fired generation development, but recognizes the announced retirement of 550 MW of coal generation at Boardman (OR) in 2020, 670 MW (Unit 1) and 670 MW (Unit 2) at Centralia (WA) in 2020 and 2025, respectively, and 522 MW at North Valmy (NV, partially serving ID) by 2025, as well as the *de facto* retirement of 172 MW at J.E. Corette (MT) in 2015.
- **Fish and wildlife:** Between 1980 and the early 2000s, fish and wildlife policies shifted reservoir storage and release patterns in the Columbia River hydro system, which has lost about 1,100 aMW (10%) of generating capability and 5,000 MW of peaking capability. Since the 6th Power Plan, increased reliance on the hydro system to provide within-hour balancing needs for wind generation has also diminished hydro peaking capability.
- **Climate change:** Long-term climate change will alter precipitation, river flows, and hydro generation, and policies enacted to reduce greenhouse gases will affect future resource choices. The Council is not tasked with resolving those uncertainties, but has investigated possible effects of climate change on the region's power system.

<u>Carbon Cost</u>

One of the major uncertainties examined in the modeling that underlies the Draft Plan (in addition to electricity demand, hydro production, and market prices of electricity

and natural gas) is carbon dioxide policy. Because state compliance plans for the Clean Power Plan are not scheduled to be completed before adoption of the final 7th Power Plan, the Council tested alternative carbon emission reduction policies--both with and without carbon costs--to assess their impact on the cost and risk of alternative regional resource strategies.

Several results of the Council's carbon modeling may be examined in tables and figures from the Draft Plan reproduced on page 9 of this summary. From its analysis, the Draft Plan offered this conclusion:

- Although compliance with the Clean Power Plan is a state responsibility, all of the Draft Plan's scenarios resulted in average annual carbon emissions below the EPA regional limit, i.e., the sum of state mass-based emission goals. "*From a regional perspective* [emphasis in original]," according to the Draft Plan, "compliance with EPA's carbon emissions rule should be achievable without adoption of additional carbon reduction policies in the region."

Proposed Actions (a selection from 46 listed actions)

- Achieve goal for cost-effective conservation acquisition (4500 aMW by 2035);
- Expand regional demand response infrastructure and market transformation;
- Adaptive and ongoing assessment and management;
- Provide continued support for NEEA;
- Encourage strengthening of efficiency codes and model conservation standards;
- BPA: analyze operating reserve requirements; mitigate oversupply conditions;
- Encourage various initiatives for resource adequacy standards, reserve margins, and system capacity issues;
- Participate in and monitor WECC activities;
- Improve forecasting methodologies (sales, loads, emerging markets, etc.).

Comparison of Planning Expectations for the Council and for Montana Utilities

In evaluating the quality of the Draft Plan, the Commission may find it useful to consider how the planning requirements and goals of the Northwest Power Act of 1980 resemble—or differ from—those placed on Montana utilities by PSC administrative rules.

Both the Power Act and PSC rules emphasize the importance of cost effectiveness, implementation plans, analysis of reliability and reserves, forecasts (economic, demand, load shape, fuel prices, etc.), a long-term planning horizon, risk quantification and management, technology assessment, environmental responsibility, and opportunity

for public involvement. The respective planning expectations differ, however, in matters of geography/jurisdiction (the Council prepares a regional plan that aggregates data, while the PSC considers plans as submitted by individual utilities). Another significant difference is that PSC planning objectives emphasize rate design, while the Council does not possess ratemaking authority.

Though the Northwest Power Plan is built upon a foundation that differs in a couple of significant ways from what the PSC is familiar with, the Draft Plan appears to have fulfilled the planning requirements of the Power Act.

Topics/Issues of Importance to Montana PSC

- The Draft Plan estimates that the average energy from distributed energy (mostly rooftop solar) will be 80-220 aMW. This contribution, however, has little impact on winter system peak, but more impact on summer peak. The Draft Plan accounts for distributed energy in its load forecast, but not as a generation resource.
- Fish and wildlife impacts on the hydro system have been significant (see page 4), however the 2014 Columbia River Basin Fish and Wildlife Program has already been adopted, so the impact of integrating that document into the final 7th Power Plan appears to be unalterable by comment offered on the Draft Plan.
- Certain elements of the Columbia River Treaty, the U.S.-Canada agreement executed in the early 1960s that addresses flood control and power optimization in the Columbia Basin, expire in 2024. The treaty's provisions do not change automatically in 2024, however, and they are now the subject of negotiations between the U.S. and Canadian governments. The Council admits that the uncertainty surrounding any future international agreement is significant, but discussion of that uncertainty and its potential ramifications is minimal in the Draft Plan.

Staff Assessment of the Draft Plan

The Draft Plan appears to have fulfilled its statutory obligations. It is well organized, clearly written, and amply documented. Although we did not have the time or resources to dig deeply into the Draft Plan's modeling tools and methodologies, the Draft Plan explains that those tools and methodologies have not substantially changed since adoption of the previous power plan. The scope of forecasting in the Draft Plan is broad, and conclusions reached in the Draft Plan are supported by reasonable analysis and a sensible blend of projection and risk.

The Draft Plan analyzed a robust set of scenarios. It evaluated over 20 scenarios and sensitivities against 800 alternative future conditions for load, hydro generation, natural gas prices, wholesale electricity prices, and CO_2 costs (including no CO2 cost). By way of comparison, NorthWestern Energy's 2013 Electricity Supply Plan, as supplemented, evaluated six scenarios against 100 alternative future conditions.

The Council's scenarios define structural conditions that impact the type and timing of resources its planning model selects to achieve a least-cost, least-risk supply strategy. For example, a scenario might assume that a major existing resource is shut down to see how the model replaces that resource under 800 alternative future conditions. To continue the above comparison, NorthWestern's planning scenarios all defined which specific resources would be acquired and the timing of those resources. NorthWestern's model evaluated the cost of each scenario under 100 alternative future conditions.

Though we have made a few questioning observations about the Draft Plan, we believe that, taken as a whole, it reflects a serious organizational effort that will become, upon final adoption, a useful tool for understanding and informing power management in the Pacific Northwest.

Figure 1 - 1: Seventh Plan Resource Portfolio[1]

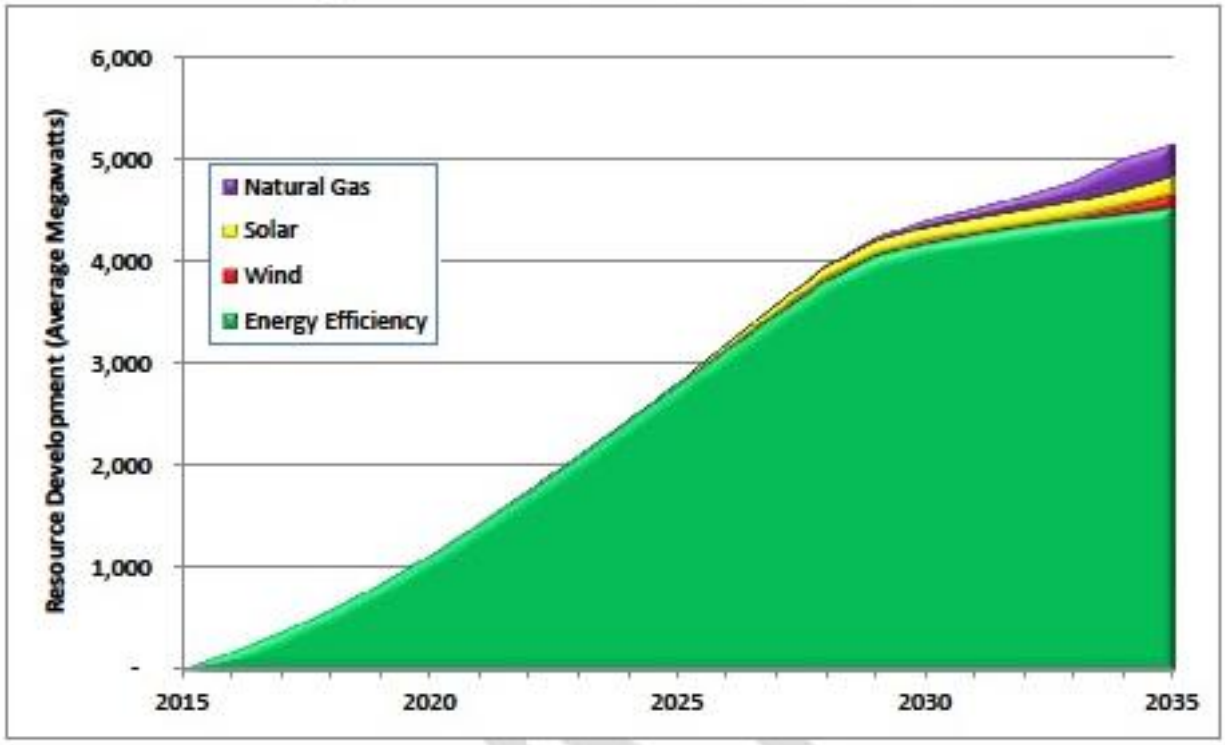

Figure 1 - 4: Energy Efficiency and Generating Resource Cost Comparison

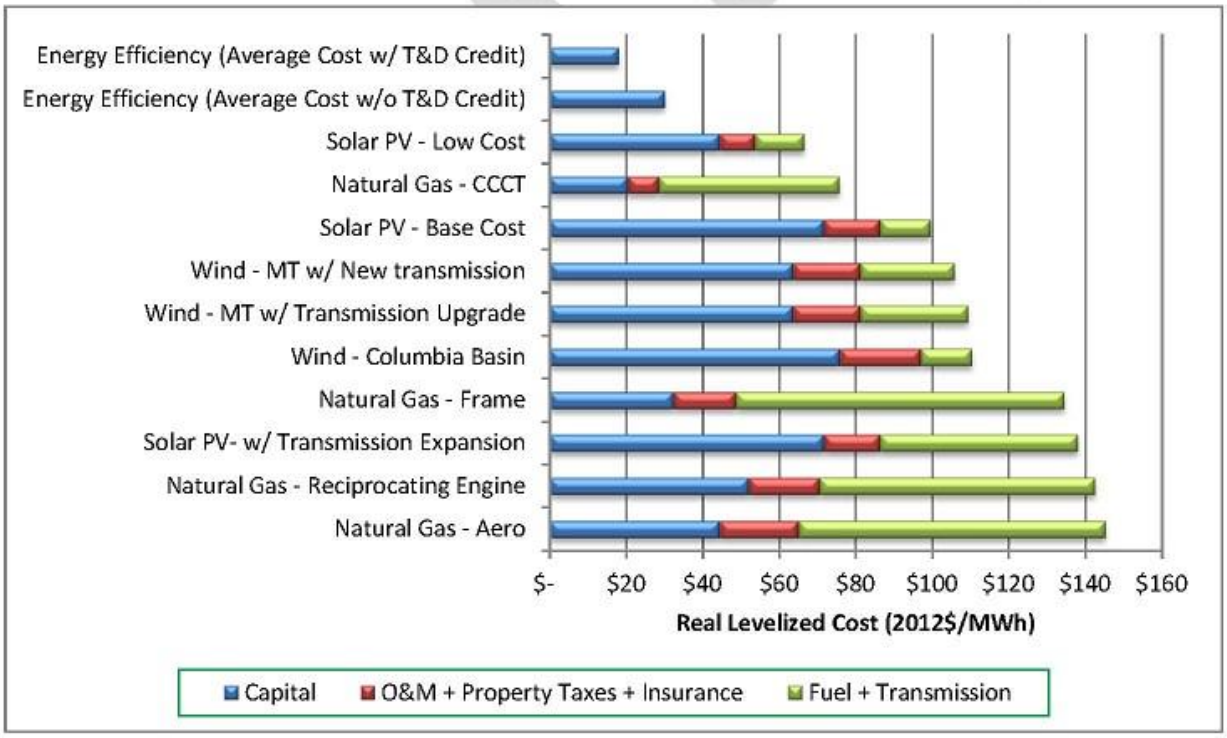

Figure 15 - 15: Average Annual Carbon Dioxide Emissions for Least Cost Resource Strategies by Scenario for Generation Covered by the Clean Power Plan and Located Within Northwest States

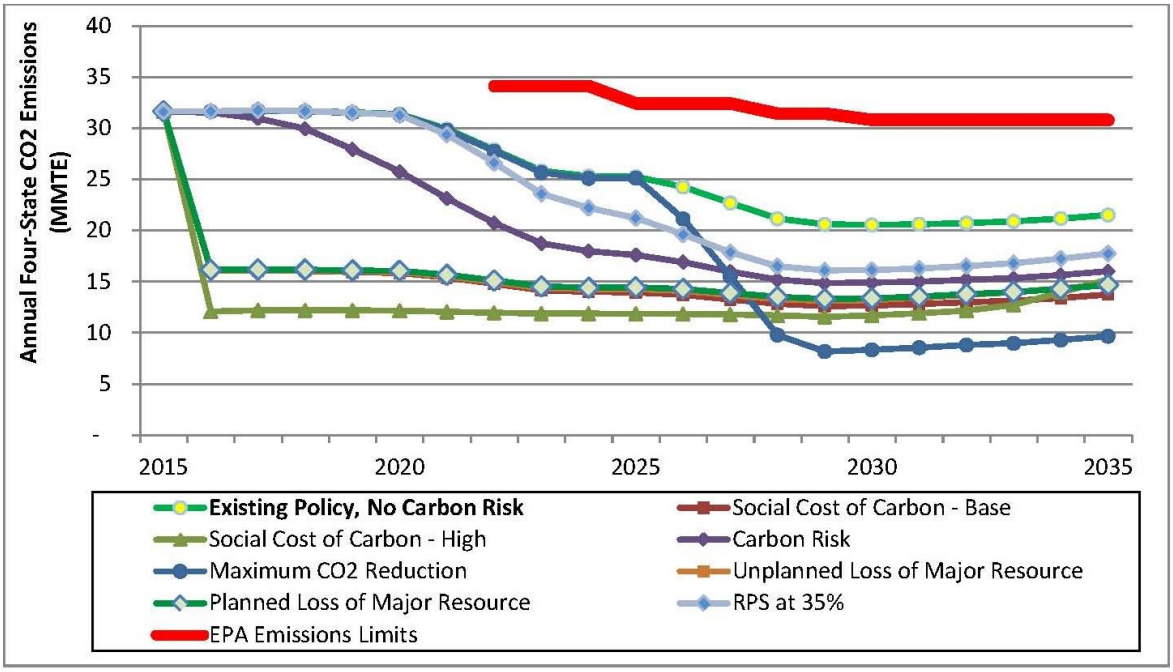

Figure 15 - 17: Annual Forward-Going Power System Costs, Including Carbon Costs